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DIANNE L. SMITH

IT is easy to look at maps of military campaigns in textbooks and be dazzled by sweeping blue and red arrows. Military history is usually painted with a broad brush; we think in terms of battles and campaigns — of thousands of men converging on a common field where they do battle. We name these struggles after a nearby town or village (Gettysburg, Waterloo or Stalingrad), even though the clash of forces may encompass a field of up to hundreds of square miles. To the uninitiated it is incredibly simple to follow the path of little coloured lines on a map. It is much more difficult to grasp the actual passage of this swarm of humanity over terrain, including not just the guns and soldiers, but the huge logistics network accompanying it. Military operations depend not only on the ground strategy or the genius of great generals, but also on terrain, the nature of the enemy, the distances to be travelled, and logistical demands. More often than not logistical constraints have been a force controlling the timing and direction of military movements.

The modern usage of the word 'logistics' or 'the art of moving armies'[1] was derived from the French rank of 'major général de logis' (translated in German as *Quartiermeister*), an officer whose duty was to lodge and camp the troops, give direction to the marches of their columns, and deploy them. As the size of forces expanded and the complexity of their movements grew, the term came to encompass arranging and superintending the march of trains of baggage, munitions, provisions and ambulances, both with the columns and in their rear, in such a manner that they would not interfere with the movements of the troops and still be near at hand; taking precautions for order and security, both on the march and when trains were halted and parked; providing for the successive arrival of convoys of supplies; collecting all the means of transportation of the country and the army,

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[1] Baron Henri Jomini, *The Art of War*, trans. and ed. by Captain G. H. Mendell and Lt W. P. Craighill, Westport, Connecticut, 1962 (hereafter Jomini), p. 11.

and regulating their use; and establishing and organizing lines of supplies.[2]

The logistical system developed by Muscovy reflected its size, terrain and demography. Muscovy was an expanding state throughout the sixteenth century. The forested steppes of the region surrounding Moscow blended into the flat prairie land of the Ukraine. Major river systems, such as the Volga, Don and Dnieper, generally flowing north to south, traversed the grasslands. Apart from the short period during the Livonian War, when it controlled a segment of the Baltic coast, Muscovy was land-locked to the east, west and south. Much of its western frontier was swampland and marshes, which became an impassable quagmire once the ice melted in the spring. Population density was very low outside Moscow, one of the largest cities in Europe in the sixteenth century. Population density increased as one moved west into the Baltic and Poland–Lithuania, but decreased sharply as one moved south and east. There, few people lived and farmed, and those who did were often transient, moving on as the soil became exhausted. Defensive fortifications ringed Muscovy's borders; however, armies departing on foreign campaigns mustered internally, then journeyed for weeks to reach the border before the campaign even began.

Muscovy's logistical system reflected its method of recruiting, mustering and deploying forces. The vast majority of the Muscovite army was composed of *dvoriane* and *deti boiarskie* cavalrymen. Some servitors owned hereditary estates (*votchina*), but the bulk of the cavalrymen lived off service estates (*pomest'e*), held only for the tenure of military service. When the holder of such an estate (a *pomeshchik*) ended his service, the *pomest'e* reverted back to the state. As the army grew in complexity, other troops such as musketeers and artillerymen, were recruited. Such men formed self-generating professional cadres and received wages in cash and kind. They were led by *deti boiarskie* junior officers; however, high ranking nobles, even boyars, might occasionally be in overall command for important expeditions. Gradually many of

[2] Jomini, pp. 230–33. Clausewitz described four basic methods of provisioning troops: (1) living off local households or the community (quartering rooms); (2) piecemeal requisition by troops (confiscation); (3) regular requisitions by government officials; and (4) depots. Clausewitz did not consider 'living off the land' either by quartering or confiscation as efficient means of provisioning troops. Foraging expeditions had neither the time nor means to find everything, nor the transportation to move it all if they did. Troops were so concentrated in one place that the area from which food could be gathered was insufficient. As Clausewitz asked, 'what . . . can be expected where 30,000 men are extorting food within a range of five miles or 15 to 20 square miles?'. Some units would get more than they could use and much would go to waste, while others would go without. Carl von Clausewitz, *On War*, trans. and ed. by Michael Howard and Peter Paret, Princeton, New Jersey, 1976, pp. 320–22. This imposed two major limitations on warfare: it became of prime importance to fight on enemy territory and it became impossible to stay in any area too long.

these units were absorbed into the regimental structure. Although there was a trend towards specialization among some servitors to be 'artillery officers' or '*oboz* officers' (transport), there was still a predominant generalization of function, so that one year a servitor might ride in the cavalry, the next year serve with artillery, and the next return to cavalry. Specialists were the exception, rather than the rule.

Whether used offensively or defensively, armies were structured around the basic Muscovite tactical unit, the regiment (*polk*), commanded by a voevoda.[3] A Muscovite army was usually composed of five regiments: the Main Regiment, the Advanced Regiment, the Guard Regiment, the Right Wing, and the Left Wing. Formations were based on their functional purpose. The Main Regiment provided overall command and was the centre around which all tactical operations revolved. The Advanced Regiment travelled in front of the army to scout the enemy's location and make first contact. The Guard Regiment, also known as the Rear or Reserve Regiment, travelled behind the main body for rear security. The Right and Left Wings protected the flanks of the Main Regiment and served as enveloping forces. On occasion, two other regiments appeared: the Sovereign's Regiment (when the tsar was present) and the Reconnaissance Regiment, first mentioned in 1524, which provided a light cavalry screen in front of the Advanced Regiment for reconnaissance and security. By the end of the sixteenth century these were joined by an Artillery Regiment and a Transport Regiment.

Muscovite forces were traditionally divided into land forces and water forces. Both forces were listed separately in the service rosters with commanders for each. For example, records for the 1530 invasion of Kazan′ show that Prince I. F. Bel′skii commanded water forces travelling by boat ('v sudakh') and Prince M. L. Glinskii commanded cavalry forces ('koni') travelling overland. Both forces left Moscow independently and assembled near Kazan′ for the assault. This practice allowed the slower infantry and artillery travelling by water sufficient time to reach the assembly area without slowing down the cavalry; at the same time, it staggered the area over which the army was travelling to avoid depletion of food sources. Cavalry forces might also split up to travel by regiments.[4]

[3] The translation of 'polk' as regiment does not imply equivalence to modern institutions with formal traditions and combined arms force structures. A Muscovite polk more closely resembled its contemporary institution, a Henrican 'battle' in England.

[4] During the 1552 campaign against Kazan′, the Guard Regiment and Scout (Ertaul) Regiment travelled a northern route from Moscow (departing 16 June), joining the Left Wing near Murom to travel to an assembly area near Alatyr′. The Left Wing departed north-east from Kolomna (19 June) to Vladimir, then south-east to Murom. The Advanced Regiment, Main Regiment, and Right Wing departed from Kolomna on a southern route (although the Advanced Regiment was side-tracked to fight off a Crimean Tatar attack on

The actual make-up of a field army depended upon the nature of the enemy in that particular campaign. Muscovy needed a predominantly cavalry army with infantry and artillery support to fight the Tatars in the south. To fight in the north and west (more highly urbanized and fortressed areas), a different force structure, predominantly infantry and artillery with cavalry support, was needed. Each presented its own logistical challenges.

It is difficult to estimate how many men and horses comprised an army. Contemporary estimates of the size of a Muscovite army ranging into the hundreds of thousands seem an exaggeration. Soldiers in such a mob would only hinder one another on the battlefield. Military historians such as Strokov and Razin have set the figure of 50,000 to 100,000 based on the dimensions of the battlefields involved. Kirpichnikov has argued that such a size is still an exaggeration because soldiers had to be able to see the main regimental banner and hear commands.[5] Instead, based on a maximum of six regiments participating in a sixteenth-century battle, it is doubtful whether any army exceeded 35,000 men, which according to the medieval scale was sufficient.[6] Each cavalryman was to bring at least one, preferably two, horses. Horses also transported the artillery, served as mounts for some infantry troops, and pulled the provisions carts and *guliai gorod*[7] trains. The number of horses was dependent upon the number of gentry cavalrymen mustered and the size of artillery and logistics support.

The principal official agency for military affairs (*Razriad*) kept count of the number of servitors in all campaigns, but only three such documents (for 1563, 1577 and 1578) have survived. The 1563 army campaigning against Polotsk totalled 30,991. The 1577 campaign was roughly the same size: 6,375 regimental cavalrymen, 486 artillery troops, 404 members of the tsar's entourage, 7,095 *strel'tsy* and

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Tula on 24 June). The entire force assembled between Alatyr' and Boroncheevo on 4 August, then set out for Kazan'. At the same time, infantry troops, artillery and supplies were sent by water. Thus, four separate routes were used to limit depletion of food stuffs, keep local resources from being devastated and avert one long baggage train. *Polnoe sobranie russkikh letopisei*, XIII, St Petersburg, 1904 (hereafter *PSRL*), Part 1, pp. 178–80; Part 2, pp. 477–79.

[5] A. N. Kirpichnikov, *Voennoe delo na Rusi v XIII–XV vv*, Leningrad, 1976, p. 16.

[6] Ibid. Al'shits argued that if a golova was the head of one hundred men, then by analysing the number of golovas we can estimate the number of troops in a field army. For example, during the 1559 campaign to Riga and Narva, the following number of golovas was present: Main Regiment — 15; Advanced Regiment — 9; Right Wing — 8; Left Wing — 7; and Guard Regiment — 7. A total of forty-six golovas would indicate a force of approximately 4,600 men. Such a theory is interesting, but scattered references within the service lists detailing the number of troops within a regiment reveal the wide variation of troops which actually served under various golovas. Therefore, his theory cannot be taken at face value. D. N. Al'shits, Razriadnaia kniga moskovskikh gosudarei XVI v.', *Problemy istochnikovedeniia*, Moscow, 1958, p. 147.

[7] A portable, pre-fabricated fortress transported by cart or sled.

Cossacks, 4,237 service Tatars and Cheremissy,[8] and 12,724 *pososhnye liudi* (peasant levies) for a total of 32,325. The 1578 force, which included Reconnaissance and Sovereign's Regiments, totalled 36,625 men.[9] If an average cavalryman brought two horses, then in the 1577 campaign the cavalry force would equal 38,000 horses. This does not include the unknown number of horses for the 486 artillery troops or those transport horses used by the 12,724 *pososhnye liudi*.

The popular image of Muscovite logistics is that, in comparison to the long trains of its European and Ottoman neighbours, Russian soldiers, predominantly cavalrymen, simply brought along what each needed (or could afford to bring) to feed himself, his retainers and his horses for the prescribed period, usually forty to sixty days.[10] Border garrisons could stockpile resources on friendly soil, but field armies deploying beyond the borders of Muscovy had either to bring their own supplies or to live off the land. How accurate is this assumption?

Special field rations were used by Muscovite armies operating before the development of modern refrigeration and canning techniques. Military sources do not address the matter, but foreign travellers often

[8] Service Tatars and Cheremissy (a Trans-Volga tribe brought under Muscovite rule following the conquest of Kazan') served as auxiliaries in exchange for border *pomest'ia*.

[9] *Vitebskaia starina*, IV, 1884, pp. 94–110.

[10] In order to sustain life, an individual must obtain sufficient daily amounts of both protein and calories. The caloric content of an army ration needed to sustain a soldier in combat conditions is 3,600 calories a day. A similar caloric requirement, 3,400 per day, is needed by a 120-pound individual engaged in carrying a moderate load for eight hours in addition to other normal activities. Seventy grams of protein are needed daily to avoid malnutrition. The major staple of Muscovite soldiers would have been grain products, since they were most readily available and easy to carry. When milled, one kilogram (2.2 pounds) of wheat mill will weigh 900 grams (two pounds) and contain 3,150 calories and 90 grams of protein. When it is made into bread, calories are lost; one kilogram of bread provides 2,500 calories and 100 grams of protein. This, however, is not the same as the amount of absorbable calories and protein actually digested by the individual. Because of the cellulose content, only 90% of the calories and 80% of the protein are actually digested. From the original kilogram of wheat milled, baked and digested, only 2,025 usable calories and 80 grams of protein are acquired. Therefore, 3.5 pounds of flour (3.9 pounds of grain) are necessary for 3,600 calories daily. Biscuits made from wheat contain about the same amount of calories and protein. In the process of cooking porridge, however, the caloric content of grain is sharply reduced to only 450 calories per kilogram. Millet and barley have slightly more calories and slightly less protein per pound than wheat. The soldier's basic grain ration would have to be supplemented whenever possible by meat, fish, fruit, oil and cheese. Beef and cheese contain more calories and protein than an equivalent weight of bread, and the other products contain less. An average water ration is two quarts. See Donald Engels, *Alexander the Great and the Logistics of the Macedonian Army*, Berkeley, 1977 (hereafter Engels), pp. 123–25. Humans also require 12 to 15 grams of salt a day. See R. E. F. Smith, *Peasant Farming in Muscovy*, Cambridge, 1977 (hereafter Smith), p. 74. The average man cannot march more than 12–18 miles a day and carry more than 80 pounds with him. Modern medicine suggests that the most efficient load is one-third of a person's body weight. Conditioning cannot increase these ratios. See Theodore Ropp, *War in the Modern World*, Durham, North Carolina, 1959, p. 14. Contemporary Muscovites were unaware of nutritional requirements and were more concerned with staving off hunger than balanced meals. Their diet was catch-as-catch-can; average soldiers were generally malnourished on campaign.

commented on their bill of fare, especially about those items eaten when normal fruits and vegetables were unavailable, Contarini, describing a journey between Astrakhan′ and Moscow, noted that the Tatars accompanying their caravan lived off horsemeat and milk only; therefore, he was forced to provide for himself as best he could. They took along 'a little rice with which a mixture is made with milk dried in the sun, and called *thur*, which becomes very hard, tastes rather sour, and is said to be very nourishing. We also had onions and garlic, besides which I obtained with much trouble a quart of biscuits made of good wheaten flour and a salted sheep's tail.'[11] In 1556 the Englishman Stephen Burroughs, captain of the *Searchthrift* during explorations toward the Ob′ River, was provisioned by Russian fishermen. They presented him with 'six ringes of bread which they call *colache*, four dried pykes and a packe of oatmeal, ... white and wheaten bread, aquavitae, and meade'.[12] When the papal envoy Antonio Possevino described the negotiations at Kieverova Gora hamlet (near Iam Zapol′skii) in the early 1580s, he noted the special feeding arrangements of the 300-man Muscovite delegation. 'To reduce expenses, they brought in supplies from Novgorod, some two hundred miles away, which included food already cooked and preserved by the cold.'[13]

Other foreigners specifically addressed army rations. Sigismund von Herberstein, the Austrian envoy in the first decades of the sixteenth century, commented on Muscovite frugality and parsimony when fresh food was not available, and was amazed that they could support themselves for so long on so little. A Muscovite could carry all the necessities of life on a single horse.

> In the first place he has some ground millet in a bag two or three palms long, then eight or ten pounds of salt pork, with some salt in a bag, mixed, if he be rich, with a little pepper. Besides this, every man carries with him a hatchet, some fuel, and a kettle or a copper porriger, so that if he chance to come to a place where he finds no fruits, or garlic, or onions, or game, he then lights a fire and fills his porriger with water, into which he throws a spoonful of millet with some salt, and boils it, and both master and serfs live content with this fare.[14]

He added that 'the general of the army and other military officers sometimes invite such as are poorer, who, after they have had one good

[11] Josafa Barbaro and Ambrogio Contarini, *Travels to Tana and Persia*, London, 1873 (hereafter Barbaro and Contarini), pp. 151–52. The problems associated with travellers' accounts are well known. I have tried to limit citations to those most likely to result from actual observation or first-hand experience.

[12] F. D. Morgan and C. H. Coote (eds), *Early Voyages and Travels to Russia and Persia*, London, 1886, vol. 1, pp. 338–39.

[13] Antonio Possevino, *The Moscovia*, Pittsburg, Pennsylvania, 1977, p. 20.

[14] Sigismund von Herberstein, *Notes on Russia*, London, 1851, vol. 1 (hereafter Herberstein), p. 99.

dinner, sometimes abstain from meat for two or three days. Also when they have fruits or garlic, or onions, they can easily dispense with everything else.'[15] Richard Chancellor, the Englishman who 'discovered' Muscovy in 1553, noted that the Russian horseman's drink 'is the cold water of the river mingled with oatmeal, and this is all his good cheer, and he thinketh himself well and daintily fed therewith . . .'.[16] Giles Fletcher, the English ambassador in 1589, noted that 'they bring with them commonly into camp for victual a kind of dried bread (which they call *sukhar'*) with some store of meat, which they temper with water and so make it into a ball or small lump of dough called *tolokno*. And this they eat raw instead of bread. Their meat is bacon or some other flesh or fish dried after the Dutch manner.'[17] The French mercenary, Jacques Margeret, described field rations at the end of the sixteenth century:

> They consist of sukhari, which is bread cut into little pieces and dried in an oven like a biscuit. Then there is *krupa*, which is made of millet and hulled barley, but principally of oats. Then they have *tolokno*, which is made of oats scalded, dried, and ground into flour. This they use in various ways, in both food and drink, putting two or three spoonfuls of that flour in a good draught of water, along with two or three grains of salt, stirring it, and drinking it; they consider this to be a good and wholesome beverage. Then they have pork, beef, mutton, salted and dried in smoke. There is also butter and dried cheese, pounded fine like sand. With a spoonful or two of this they make good soup. Then there is plenty of aqua vitae and some dried and salted fish they eat without cooking. This is the provision of the most important persons; as for others, they content themselves with biscuit, some krupa of oats, and tolokno, with a little salt.[18]

Yet campaigns often lasted longer than the period of consumption of transported supplies.[19] Non-cavalry forces, such as artillery and

[15] Ibid.

[16] Lloyd Berry and Robert Crummey, *Rude and Barbarous Kingdom*, Madison, Wisconsin, 1968 (hereafter Berry and Crummey), p. 28.

[17] Giles Fletcher, 'Of the Russe Commonwealth' (hereafter Fletcher), in ibid.

[18] Jacques Margeret, *The Russian Empire and the Grand Duchy of Muscovy. A Seventeenth Century Account*, ed. and trans. by Chester Dunning, Pittsburg, Pennysylvania, 1983 (hereafter Margeret), pp. 50–51.

[19] The British Army conducted tests to evaluate the relationship between the weight of a horse and its freight-carrying power. They found that the weight a horse is capable of carrying or pulling is directly proportional to its body weight. A horse's nutritional requirement is also directly proportional to its body weight. The ratio between the horse's consumption rate and his carrying capability in pounds remains approximately 1:10, no matter what the size of the animal. It is this ratio that determines how far the army can travel before the animals consume all the supplies they are capable of carrying. The use of smaller horses in the baggage train would not significantly affect the army's gross consumption rate of food because more smaller horses would be needed (than standard-size horses) to carry a given rate. For example, if any army detachment needed 3,000 pounds of supplies carried for one day, they would require 15 standard-size horses of 1,000 pounds capable of carrying 200 pounds apiece, or 20 ponies of 750 pounds, capable of carrying 150 pounds. Since the ratio between food requirements and carrying capabilities in pounds remains constant, both

infantry, required provisions for crews and transport beyond those contracted for garrison life. How did one actually live off the land?[20]

Russia's geographical location played an important role in determining what foodstuffs were available for troops. Spring lasts for about fifty days. During that period crops are being planted, but not yet edible. Armies living off the land cannot survive unless crops are mature. Autumn also averages fifty-five days. Crops are harvested and stored. Freezing weather prevails from 100 to 150 days each year, with snow cover from twenty to seventy days. Fodder is difficult to secure, but frozen food is easily transportable. Russian agriculture has traditionally suffered from its northern latitude; the growing season is short and subject to disaster with any slight variation of rainfall, a cold, wet planting season, a late frost, or heavy rainfall at harvest time. Water would generally not be a problem in operations north and west of Moscow, although operations to the south not linked with river systems might present problems with water sources, especially in those areas coinciding with the end of the forest steppe.

Crop patterns also affected grain availability for troops and forces. Grains were grown over the entire operational area. Giles Fletcher noted that 'their rye is sowed before the winter, all their other grain in

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groups would have consumed approximately the same amount of supplies per day, about 300 pounds. Basically a horse can carry 200 to 250 pounds for extended distances for eight hours a day at about four miles an hour. One animal can carry non-comestible supplies for approximately 50 individuals. An army can carry its own provisions only for 25 days since by that time pack animals would have eaten all the supplies at ten pounds per day. Engels, pp. 126–29.

[20] The best example of a contemporary army that truly lived off the land is the Crimean Tatars to Russia's south, a truly mobile force which was self-sufficient on the march. They traditionally raided Russia once or twice a year (seeking slaves and booty), usually during the summer season, which made it easier to live off the land. The Tatars rarely carried firearms, preferring the Turkish composite bow and hand weapons such as the scimitar. When called up for service, Crimean Tatar warriors were required to muster with at least two horses (one to ride and the other as a spare or to kill for food). Horseflesh was the field staple of the Crimean Tatar. Horse herds could also provide mare's milk, while fruits and vegetables could be gathered along the route. Margeret claimed that the Tatars also took along sun-dried meat (Margeret, p. 45). Crimean Tatar logistics became more complex, however, when they fought with allies. They were sometimes supplemented by Ottoman troops; for example, during the 1556 Russian conquest of Astrakhan', the Crimean khan sent to Astrakhan''s defence 700 Tatars and 300 Ottoman janissaries with cannon and muskets (S. M. Solov'ev, *Istoriia Rossii s drevnykh vremen'*, 2nd edn, St Petersburg, 1896, vol. 1, part 3, p. 90). During the 1552 Muscovite campaign against Kazan', the Crimean Tatars attacked in the direction of Tula, augmented by Turkish janissaries and artillery. The Muscovite army had to fight them off before it could continue the advance on Kazan' (*PSRL*, XIII, part 1, p. 189). Their increasing reliance on external sources is evident in the fact that during a 1555 battle with the Crimean Tatars, boyar I. V. Sheremetev seized the entire supply train of the Tatars, forcing Devlet Girei to retreat (*Russkaia voennaia sila*, vol. 1, Moscow, 1892, p. 177). The primitive Crimean Tatar logistical system did not have the capability of supporting Ottoman janissaries or artillery; therefore, they must have been supplied by trains manned by the Drivers Corps. The augmentation of infantry and artillery by mid-century is a reflection of the increasing complexity of warfare on Russia's southern frontier. As Russia developed a combined arms force, the Tatars borrowed similar units from the Ottomans, inheriting comparable logistics problems as well.

the springtime, and for the most part in May'.[21] Rye and oats seem to have been the main crops in the central area, although some barley was also grown, as well as small quantities of spring-sown wheat and spring rye. Buckwheat was also grown fairly widely by the sixteenth century, although not on a scale comparable to rye or oats.[22] Millet was restricted to Moscow and Radonezh. There was an active internal grain trade; Fletcher noted that 'their fields yield such store of corn that in conveying it towards Moscow sometimes in a forenoon a man shall see seven hundred or eight hundred sleds, going and coming, laden with corn and salt fish'.[23]

Coniferous forests, mixed and deciduous forest, and forested steppe also covered much of the operational area. The forest is a valuable food gathering area. Foreign travellers mentioned apples, pears, plums, cherries, melons, cucumbers, strawberries and hurtleberries, with many other berries in great quantity in every wood and hedge.[24] Barberries, cowberries, cranberries, bilberries, bog whortleberries, dewberries, raspberries and currants also grew in abundance.[25] Supplies were not always available or plentiful, however. The fifteenth-century traveller Ambrogio Contarini stated that there was no fruit for sale in Moscow with the exception of a few watermelons and wild apples.[26]

Forests also provided an abundance of fowl, fish and game. Such food sources were available throughout the year. Margeret described a multitude of wild fowl (pheasants, partridges, thrushes, blackbirds, quail and larks). There was a great abundance of swans, geese and wild ducks in winter and wild game (stags and wild goats in large numbers to the east and south, in the plains of Tatary and between Kazan′ and Astrakhan′), and a 'great many' elk.[27] He noted that in all of Europe there 'are no better nor more diverse kinds of fresh water fish than the Russians have in great abundance. These include sturgeon, beluga, belaia ryba (a white fish larger than salmon), sterlet (a kind of sturgeon) and all the varieties of fish which we have in France, except trout'.[28] Fletcher also commented on the quantity of fish. He noted common sorts such as carp, pike, perch, tench and roach, but also commented on four kinds of fish bred in the Volga (beluga, sturgeon, sevriuga and sterlet), which were caught 'in great plenty and served

[21] Fletcher, p. 117.
[22] Smith, p. 87.
[23] Fletcher, p. 32.
[24] Ibid., p. 117.
[25] Smith, p. 57.
[26] Barbaro and Contarini, p. 161.
[27] Margeret, pp. 11–13.
[28] Ibid, p. 13.

thence into the whole realm for a great good'.[29] Fletcher listed Iaroslavl', Beloozero, Novgorod, Astrakhan' and Kazan' as chief towns for fish. They 'all yield a large custom to the emperor every year for their trades of fishing which they practice in summer, but send it frozen in wintertime into all parts of the realm'.[30] Such fish was frozen, sun-dried, cured and prepared in brine.[31] During the nineteenth century fish protein comprised 43% of meat protein intake; during the fifteenth and sixteenth centuries it was probably higher.[32] Wild game such as deer, bison, boar and hare were not a major element in the Muscovite diet, but would be a valuable source of meat and protein in the field.[33]

Finally, the forest provided honey and fungi. Wild honey was used in preparing mead and as a sweetener on gruel and wheat.[34] Fungi (mushrooms, still avidly collected by Muscovites as a diet supplement) were an abundant and valuable source of protein for they contain up to 73% protein and 2% fat. Present estimates of quantities of wild fungi collected can reach five million tons per year in Russia.[35]

Rations were required not only for men, but also for the horses used for cavalry and transport.[36] On a military campaign, a horse doing modern work needs 20–24 pounds of provisions or a daily ration of 24–32 pounds for hard work. Half of this ration should be grain and the other half fodder.[37] Military practice has shown that cavalry and transport horses

[29] Fletcher, p. 122.
[30] Ibid.
[31] Smith, p. 65.
[32] Ibid., p. 66.
[33] Ibid., p. 69.
[34] Ibid., p. 76.
[35] Ibid., p. 59.
[36] We know of Russian stock from the French mercenary Jacques Margeret: 'Most of their horses come from the Nogai Tatars, which horses they call koni. They are of a middling size, very good for work, and they can run for seven or eight hours without being winded. . . . They are very wild and are greatly terrified by the noise of a harquebus. They are never shod; nor, for that matter, are the horses which come from Russia. . . . They also have jennets from the Georgians, but they are not common. They are very beautiful and good horses, but they do not compare with the koni for long wind or speed, unless it is just for a short run. They have some Turkish horses and some from Poland which they call argamaks. There are some very good ones among them. These horses are all geldings. Beyond this, there are found a few very good ponies among the Nogai Tatars. These are all white and spotted with black, like a tiger or leopard, so that one might think them painted. The horses native to the land are called merina. They are usually small and good, especially those which come from Vologda and that region. They are quicker to train than the horses of Tatars. A very beautiful and good horse of Tartary or of Russia can be bought for twenty rubles. This horse will do more service than a Turkish argamak horse, which costs fifty, sixty, up to one hundred rubles.' (Margeret, pp. 47–48) He added that Muscovites did not think a horse fit for work until it was seven or eight years old. Horses continued to work until they were twenty years old; he claimed to have seen horses 25 to 30 years of age still serviceable (Margeret, p. 49). See Smith, p. 237, for a discussion of the price of a Russian warhorse (*kon'*).
[37] It is estimated that rye straw weighed twice as much and oat straw one-and-a-half times as much as the grain harvested. Probably much of this straw would be grazed, since grain appears to have been cut fairly high to judge from illustrations in manuscripts. Such uncut straw was edible to horses, although cattle refused to eat it (Smith, p. 88).

require from five to 15 gallons of water per day, depending upon the temperature; the average quantity is eight gallons per day. Thus, a medium-size horse doing moderate work requires ten pounds of grain, ten pounds of fodder, and eight gallons of water per day.[38] Horses also require 50 grams of salt a day.[39]

A further consideration is that, unlike men, the physical condition of cavalry and transport animals cannot be restored by rest and proper diet after they have been worn out by several days of excessive work and inadequate rations. Such treatment renders them unfit for further use. The British Army Veterinary Department declared (in 1908) that while a fit animal can endure hardship and exertion without injury, 'once a troop horse is sick, injured, or exhausted it is only an encumberance to a fighting unit and has to be left behind, his place being filled by a fresh animal'.[40] That is why 'the transport animals of any army shall be regarded as worth their weight in gold, no care or supervision can be too great or too strict'.[41] Russian horsemen were aware of these factors. Margeret noted that when Russian horses become tired and winded, they need four or five months to recover completely.[42]

Many foreign accounts emphasize the general hardiness of Muscovite horses, but these must be viewed critically. Richard Chancellor commented that Muscovite horses could 'well abstain' from feed for two whole days, feeding on the bark of trees and the most tender branches in time of war. He claimed that Russian war horses could endure this 'scant and miserable manner of living' for two months 'lusty and in good state of body'.[43] Chancellor, of course, did not spend extensive time with field armies. Margeret claimed that Russian horses ate little or no oats and that little by little they had to be made accustomed to that feed if one wanted to give it to them.[44] Although he probably referred to war horses (which often had to make do with what could be foraged), Margeret was writing at the turn of the seventeenth century — a period marked by harvest failure and famine — when grain for humans was scarce, even more so for livestock.

Russia's geographical position also played an important role in the transport of foodstuffs. Winters in central Russia are harsh. To an Elizabethan observer, the extremes of temperature were such that:

> a man would marvel to see the great alteration and difference betwixt the winter and summer in Russia. The whole country in winter lieth under snow, which falleth continually and is sometime of a yard or two thick but

[38] Engels, pp. 126–27.
[39] Smith, p. 74.
[40] Ibid., p. 285.
[41] Ibid., p. 199.
[42] Margeret, p. 48.
[43] Berry and Crummey, p. 28.
[44] Margeret, p. 48.

> greater toward the north. The rivers and other waters are all frozen up a yard or more thick, how swift or broad soever they be. And this continueth commonly five months, viz., from the beginning of November till towards the end of March, what time the snow beginneth to melt. . . .[45]

Considering the bog-like conditions of Russian roads during the spring and summer, travel was easier in the winter for land forces because sleds could more easily traverse the frozen soil. As noted by Fletcher: 'In the wintertime the people travel with sleds in town and country, the way being hard and smooth with snow; the waters and rivers are all frozen, and one horse with a sled will draw a man upon it four hundred miles in three days; but in the summertime the way is deep with mire and travelling is very ill.'[46] Such weather, however, had a detrimental effect on water forces. While normal cold was not sufficient to freeze over major river systems such as the Oka and Volga completely,[47] it incapacitated smaller systems. Water forces had to wait until the icy waters were free of impediments (such as ice floes) that could sink ships and were not so frigid that capsized crews and horses would immediately perish.

Once the warning order was issued for a campaign, cavalrymen dispatched horses and supplies beforehand to a staging area. According to Margeret, once orders were issued throughout the country concerning the upcoming campaign, 'while the snow is still on the ground', each member of the military was to send his provisions by sleigh into the towns near which it had been resolved to await the enemy.[48] From there, consolidated supplies could be carried on pack animals, carts or boats. Giles Fletcher confirmed that cavalrymen received no provisions from the state; every man was to bring 'sufficient for himself to serve his turn for four months'. But, he added, 'if need

[45] Fletcher, p. 114.

[46] Ibid., pp. 57–58. Terrain does not change; half a century later when Adam Olearius first journeyed to Muscovy (1633) he arrived in Riga on 14 November, then 'spent five quiet weeks in the city, until the frost and snow had prepared a good sledge road for us across the outlying swamp'. Reaching Narva on 3 January 1634, his party was delayed by 22 weeks. 'When we realized that we should be unable to depart until spring and that it would be very difficult to travel the road between Narva and Novgorod', packhorses and heavy baggage were sent ahead to Novgorod on 28 February 'by the good sledge road'. Samuel Baron, *The Travels of Olearius in Seventeenth Century Russia*, Stanford, California, 1967 (hereafter Baron), pp. 36–39.

[47] Smith, p. 220.

[48] Margeret, p. 50.

require, to give order for more to be brought to him to the camp from his tenant that tilleth his land or some other place'.[49]

Artillerymen and infantrymen were paid a wage and expected to pay for their own provisions. However, the state provided the weapons and transported them. Horsey related that a group of foreign prisoners facing execution was recruited instead to fight the Crimean Tatars. 'Money, clothes, and daily allowance for meat and drink was given them, horse, hay and oats; swords, piece, and pistols were they armed with.'[50] Although there are no records concerning this, it would be practical to assume that artillerymen drove the wagons and gun carriages for artillery pieces, while infantrymen drove wagons carrying infantry provisions and the portable fortress, *guliai gorod*.[51]

Once in the field, provisions for the armed forces were carried in peasant carts with the advancing army. By the mid-sixteenth century each army appointed a *voevoda* and several *golovy* to be in charge of transport. The transport *voevoda* might also be jointly responsible for artillery, which was reasonable, since a large part of artillery operations would be the transport of the guns, shot and gunpowder. Another special *golova* or *voevoda* was responsible for travelling in front of the army to select rest stops and night quarters.[52] Water and sufficient fodder would be important criteria in selecting such stops. Herberstein described a field camp, which probably did not change much over the course of the century:

[49] Fletcher, p. 184. According to Richard Hellie, the servitors bringing the supplies were slaves. Hellie cites a 1556 list which mentions 150 baggage train slaves belonging to 71 owners. The baggage-train slaves looked after their owners' supplies and perhaps, assisted in the defence of the baggage train. Hellie suggests that the 1556 list of baggage-train slaves is incomplete, for probably almost every serviceman brought one. There was no 'state interest' in baggage-train slaves and the record-keeping of such people was just in the process of being worked out. Richard Hellie, *Slavery in Russia 1450–1725*, Chicago, 1982, pp. 467–68.

[50] Sir Jerome Horsey, 'Travels' (hereafter Horsey), in Berry and Crummey.

[51] In comparison, the Ottoman government provided its armed forces with weapons, ammunition and shot. The Mortar Men manufactured, transported and fired the mortars, mines, grenades and bombs used against enemy forts. The Armourer Corps supplied infantrymen with weapons (firearms, bows and arrows, scimitars, daggers and axes) and transported them. By tradition each janissary (professional infantryman) could select his own weapons at the state armoury before a campaign. The Cannon Corps manufactured and fired the artillery pieces. The Drivers Corps transported arms and ammunition during campaigns and also manufactured and stored the cannon wagons. Oxen and buffalo were specially raised in Rumelia to pull wagons and haul cannon, while mules and draft horses from the lower Danube and camels from Anatolia and the Fertile Crescent were used for lesser loads. A small fleet of small boats was maintained to carry cannon by water. Artillery was transported to battle in a single train under the Master General of Ordnance who also deployed it in battle. Stanford Shaw, *History of the Ottoman Empire and Modern Turkey*, Vol. I: *Empire of the Gazis: The Rise and Decline of the Ottoman Empire, 1280–1808*, Cambridge, 1976, pp. 124, 130.

[52] The positions of 'quartiermeister' and 'campmaster' in central Europe had the same responsibility.

> They select a very extensive space for pitching their camp, where the leading men erect tents, others make a sort of arch of bushes on the ground, and cover it with wrappers, and under these they place their harness, and bows, etc., and protect themselves from the weather. They drive their horses loose to pasture, which is the reason for their having their tents so wide apart. They never fortify their camp with their chariots,[53] or with a ditch, or any other implement, unless the place itself happen to be naturally defended either by woods, rivers, or marches.[54]

Each regiment also had its own transport (*oboz* or *kosh*). The Razriadnaia Kniga for the Livonian campaign noted that transport should accompany its own regiment ('vsiakomu itti za svoim polkam').[55] Such subdivision of carts and supplies would make sense, for servitors needed ready access to the supplies they had brought along for themselves. Also, en route to the campaign, regiments generally travelled along disparate routes to avoid taxing local resources. According to Korotkov, during a 1564 campaign by Prince Shuiskii from Polotsk to Orsha, the oboz consisted of 5,000 vehicles for a 17,000 to 18,000-man force.[56] Such trains were protected by special detachments of strel'tsy and Cossacks. If trains were lost or delayed, a special *golova* was appointed to prioritize distribution of remaining supplies.[57]

Conditions on the march were still harsh, as shown by Prince Andrei Kurbskii's description of his journey overland to Kazan', following action in the defence of Tula:

> And at that time he sent us with thirteen thousand men through the land of Riazan' and then through the land of Meshchera where the Mordvinian people dwell. Then having crossed the Mordvinian forests in about three days, we came out on the great steppe and marched from it on the right

[53] As Austrian ambassador, Herberstein was very familiar with the Hussite wagon forts, which spread to Poland ('tabor') and England and Scotland ('armored cars'). See Douglas Miller, *The Landsknechts*, London, 1976, and A. V. B. Norman and Don Pottinger, *English Weapons and Warfare, 449–1660*, Englewood Cliffs, New Jersey, 1979.

[54] Herberstein, p. 99.

[55] P. P. Epifanov, 'Voisko i voennaia organizatsiia' (hereafter Epifanov), in V. R. Artsikhovskii (ed.), *Ocherki russkoi kul'tury XVI veka*, Moscow, 1976, p. 369; I. R. Korotkov, *Ivan Groznyi. Voennaia deiatel'nost'*, Moscow, 1952 (hereafter Korotkov), p. 84. One weakness of Soviet works on this period is that they often (if not usually) fail to cite the source of information, even when quoting a primary document.

[56] Korotkov, p. 84. Unfortunately, he omits where he got this information. If the figures are accurate, they contradict the image of Muscovite forces possessing less of a logistics burden than their European contemporaries. In Western Europe a force numbering 30,000 men might be followed by a crowd of women, children, servants and sutlers of anywhere between 50 and 100% of its own size; it had to have this huge 'tail' behind it wherever it went. Out of 942 wagons accompanying Maurice of Nassau on his campaign of 1610, no less than 129 were earmarked to carry the staff and their belongings. An army of this period might easily have one wagon, with two to four horses each, for every fifteen men. The Spanish were even worse; in 1606 Spinola had 2,000 to 2,500 wagons for 15,000 men. Martin van Creveld, *Supplying War. Logistics from Wallenstein to Patton*, Cambridge, 1977, pp. 6, 250. Yet, the Muscovites in this example have 5,000 wagons for 18,000 men.

[57] Ibid.

> hand side, about five days ride on horseback. . . . And after about five weeks of hunger and dire distress we arrived at the river Sura at the mouth of the little river Barysh, and he [Ivan IV] arrived there too on the same day with the main army. And on that day we had our fill of dry bread with much relish and thanksgiving . . . (for) we had had none for about nine days . . .[58]

Provisions could be augmented by purchasing or requisitioning foodstuffs from the population of the area through which the campaigning army was travelling. During the 1552 Kazan′ campaign Kurbskii noted that while travelling through the lands of the Hill Cheremisians,[59] 'we were able to get bread and cattle by buying them. Even though we had to pay very dearly for them, still we were thankful, as we were faint from hunger; . . . Cheremisian bread was found to be even tastier than costly buns.'[60] Supply and demand ruled: by the time the army besieged Kazan′, 'all victuals were bought at an extremely high price . . .'.[61]

Ivan IV strictly enforced a policy of punishing *voevody* who seized goods by force while travelling across Russia; however, forced requisition and pillage were allowable in foreign lands. During the conquest of Kazan′, for example, hungry Russian troops captured the abandoned town of Arsk:

> And they ravaged the land for about ten days, for in that land there are great plains, which are most fertile and which abound in all kinds of fruits . . . And as for grain, there are so many different kinds that it would be hard to believe . . . There are, too, countless herds of different kinds of cattle and . . . various wild beasts . . . and also many kinds of honey. . . .[62]

Forced requisition was common in the Livonian War. A report sent by *voevoda* Semen Saburov from Marienburg in June 1579 stated that *voevoda* Vasilii Khilkov had been sent 'with many people' to get supplies of bread [provisions] from the German [Livonian] cities.[63]

[58] J. L. I. Fennell (ed.), *Prince Kurbsky's History of Ivan IV*, Cambridge, 1965 (hereafter Kurbskii), p. 31.

[59] The 'Hill Cheremisians' lived south of the Volga on the 'hill bank', while the 'Meadow Cheremisians' lived west of Kazan′, north of the Volga. Olearius commented that the name Meadow [*lugovye*] came from the green pastures and hayfields that characterized the area, 'for here, owing to the low-lying and damp soil, there are many fine meadows and pastures, from which is gathered a great amount of hay to feed to their flocks' (Baron, p. 298).

[60] Kurbskii, p. 33.

[61] Ibid., p. 45.

[62] Ibid., p. 51. A Moscow *den′ga* was coin valued at half a kopek; squirrel skins were still used as a monetary unit in sixteenth-century Muscovy, approximately equivalent to three *den′gi*. The actual disposition of captured food is unclear. Kurbskii continues, 'And at that time there was much rejoicing in the Christian army and we sang our thanks to God, and in our army all forms of livestock were cheaper — one could buy a cow for ten Moscow *den′gi* and a large ox for ten squirrel skins' (ibid.). Kurbskii's mention of purchase would suggest that captured goods were not simply distributed, but rather that gentry servitors had to purchase them — thus enriching the tsar's coffers?

[63] Epifanov, p. 376.

Because sufficient supplies for horses could not be carried along, foraging was necessary.[64] A special detachment, called the *kormovshchiki*, was created for forage in unfriendly territory, especially for fodder (*korm*).[65] This was a time-consuming process and often disrupted military operations. For example, when insufficient supplies threatened Muscovite operations in 1477, part of the army was diverted by Ivan III for five days for foraging (for both man and beast); one half of every regiment was sent out in this instance.[66] According to Kurbskii's tale of the sack of Arsk, troops were diverted from combat operations for ten days. Such foraging parties were vulnerable to enemy attack. 'While some of our servants, riding on our horses, were foraging for hay, not even the cavalry commanders who were guarding them with their troops were able to afford them protection on all sides because of the evil cunning of the Mussulmans and because of their sudden, unexpected swift raids.'[67] When local natives (entrepreneurs as much as patriots) raided Russian forces, combat troops had to be allocated to chase them down. Kurbskii noted that 'a large number of Meadow Cheremisians gathered together and attacked our rear camps from the Galich road and drove off many of our herds of horses. And straightaway we sent three cavalry commanders to chase them, and after them we sent other flying detachments in battle array in order to ambush them.'[68]

A formal cadre of contractors did not exist,[69] but there is evidence that private merchants accompanied the army to sell provisions.

[64] For an excellent discussion of trains and foraging, see G. Petjes, 'Army Provisioning, Logistics, and Strategy in the Second Half of the 17th Century', *Acta historica Academiae scientarum Hungaricae*, 16, 1970, pp. 1–51. He argues that low standards of food supply and agrarian techniques, low population density, numerically increasing armies and the backwardness of transportation methods produced provisioning difficulties that paralyzed the strategy of that age.

[65] A. Baiov, *Kurs istorii voennago iskusstva*, St Petersburg, 1909, p. 79.

[66] E. A. Razin, *Istoriia voennago iskusstva*, vol. II, Moscow, 1961, p. 307.

[67] Kurbskii, p. 45.

[68] Ibid., p. 53.

[69] The Habsburgs developed a contractor system for their army in Flanders. Originally, every thirty days each soldier was entitled to a regular wage (*escudo*) and either free bed and room service on payment of an additional cash sum (the *servitiegeld* or *servicio*). From this he would himself buy food and supplies from local merchants. Payment of wages was sporadic at best and inflation surpassed wages. The insolvency of Renaissance treasuries turned the company captains into money-lenders; every captain advanced subsistence wages when no money arrived from the treasury. Naturally when the treasury did contrive to pay an instalment of wages, the captain expected to be paid back — so he would first deduct those sums already advanced 'on account'. Dishonest captains also padded the rolls with false recruits, pocketing wages advanced for them. The Habsburg solution was for the state to supply the troops' needs directly in kind through a series of contractors. The Army of Flanders' contractors directly provided bread, clothes, arms and shelter by the beginning of the seventeenth century. Eventually medical and spiritual care, a trustee service for wills, and even marriage allowances were regularly supplied. The most important item paid to the troops in kind was their daily bread — the *pan de municion* of mixed wheat and rye baked into a single loaf of one, two or three pounds. One-and-a-half pounds of *pan de municion* was

Kurbskii noted that when Russian forces converged in 1552 near the newly-built fortress of Sviiazhsk, they were met by 'countless numbers of merchants with various victuals and many other goods [who] had sailed there; and there was an abundance of all the heart could wish for . . .'.[70]

Stockpiling of military supplies was a natural adjunct to the positioning of military fortresses along major invasion routes, i.e. the southern *zaseka* line along the Oka River. Throughout the year, garrisons were maintained at these fortresses. Military doctrine called for dispersed deployment of regiments at fixed points along the zaseka line, then unification of forces at assembly points during emergencies. Thus, the use of these fortresses as supply depots makes sense. They were easily reached by interior lines of communications and were most probably situated at key river points (junctures of two major rivers, fording sites, etc.), which made resupply by water easy. These supplies could then also be used to provision field armies which extended beyond the zaseka line. Other important towns were also fortified. Fletcher noted that the four strongholds of Smolensk, Pskov, Kazan′ and Astrakhan′ were 'very strongly fenced with trenches, castles, and store of munition, and have garrisons within them to the number of two or three thousand apiece. They are stored with victual, if any siege should come upon them, for the space of two to three years beforehand.'[71] Huge quantities of military supplies could be cached. For example, when the Russian fortress at Velizh fell in 1580, the German observer Reinhold Heidenstein commented on the high quality of fortresses on the Lithuanian border, especially between the Dvina and Dnieper rivers. He noted that the 'provisions, forage, gunpowder, and ammunition were found in such huge quantities that not only did they

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recognized to constitute the minimum daily ration without which no soldier could survive. From the 1590s onwards most soldiers in the Army of Flanders received a 3-pound loaf every two days. After 1601 the provision of victuals to the entire army was centralized. It was entrusted to a single official, the *proveedor de vivere*, who was, in fact, the contractor who offered to supply a year's bread to the army at the cheapest price (which could result in the supplier going bankrupt or instances of 'bread' consisting of offal, unmilled flour, broken biscuits or lumps of plaster!). See Geoffrey Parker, *The Army of Flanders and the Spanish Road 1567–1659: The Logistics of Spanish Victory and Defeat in the Low Countries*, Cambridge, 1972, pp. 158–63. Muscovy had no comparable system.

[70] Kurbskii, p. 33. Suleiman the Magnificent established a policy (1520) that Ottoman soldiers should pay for all their own provisions along the route of their campaigns in both Ottoman or enemy territory. But they could not pay if there was nothing to buy. Therefore, the army brought along herds of cattle and sheep; cultivators living adjacent to the line of the march also supplied animals, grain, and other food, sometimes with compensation. Although the government normally did not regulate agriculture and trade, it did encourage the cultivation of grain, rice, animals and other foodstuffs along the main campaign routes so that these at least would be readily available for purchase.

[71] Fletcher, p. 189. It is doubtful that he visited all four fortresses, although English traders accessible to him might have.

suffice for all our troops, but enough remained for the whole garrison'.[72] At the end of the Livonian War, when Russian forces withdrew from ceded territories, the Polish monk, Piotrowski, commented on the military supplies left behind: 'We were all amazed to find in all the fortresses numerous cannon and abundance of powder and cannon balls more than we ourselves could collect in our own country.'[73]

The official in charge of fortress supplies was the *gorodovoi prikazchik* (city commandant), who was responsible to the grand prince (then tsar) on matters of military-administrative management.[74] He was in charge of the 'gorod' (city fortress) itself and all defensive structures. He maintained city military supplies such as gunpowder (*iamchuzhnoe delo*)[75] and food supplies stored for periods of siege. A siege *voevoda* or siege *golova* directed actual combat operations.

Besides city fortresses, according to Epifanov, provisions for campaign forces were also preserved in 'state granaries'. Supplies were collected from peasants, monasteries, church lands, votchinas and pomest'ia either in kind (grain, oats, flour, etc.) or in taxes which were used to purchase grain. By the second half of the sixteenth century there were eighteen tsarist granaries at Voronezh, nine at Sebezh, ten at Kazan', and seven at Sviiazhsk. Large 'state grain dvors' were built at Kolomna, Pronsk, and other southern fortresses.[76]

By the middle of the century the practice originated of maintaining supplies in forward-based state depots, created prior to a campaign. For example, during the 1552 Kazan' campaign, goods and military supplies were stockpiled at Sviiazhsk, upriver from the besieged fortress. On the second day of the battle for Kazan' a storm deluged the

[72] Reinhold Heidenstein, *Zapiski o moskovskoi voine 1578–1582*, St Petersburg, 1889, p. 120. His reference to provisions and force might pertain to supplies brought along by defenders; there is no Russian source to verify whether they refer to state-provided supplies for border fortresses' garrisons, although it would be a common-sense precaution for fortresses facing Bathory's invasion forces.

[73] R. Wipper, *Ivan the Terrible*, Moscow, 1947, p. 224. Hard data on actual numbers of guns and associated supplies are very scarce. Future research will focus on the materiel side of Muscovy's logistical challenge.

[74] N. E. Nosov, 'Voenno-administrativnye obiazannosti gorodovykh prikazchikov', *Ocherki po istorii mestnogo upravleniia russkogo gosudarstva pervoi poloviny XVI veka*, Moscow–Leningrad, 1957 (hereafter Nosov), pp. 79–92.

[75] Part of the populace was responsible for supplying the charcoal and other components, while urban personnel were responsible for their actual mixing. Once the gunpowder was prepared, the *gorodovoi prikazchik* was responsible for its storage within the city (Nosov, p. 86).

[76] Epifanov, p. 376. Unfortunately, Epifanov does not cite the source of this information. We do have scattered bits of evidence of government efforts to transport grain. For example, in 1582 the merchant Terekh Sotnikov was hired by the treasury to convey from Nizhnii Novgorod to Astrakhan' 2,500 chetverts of 'bread supplies' (oats and oat flour) in his own ships and tsarist ships (built in Murom and Suzdal') for which he was given a 'propusknaia gramota' (free passage document) (Korotkov, p. 84). One *chet* equals four *puds* of rye (approximately 145 pounds) or two-and-a-half puds of oats (approximately eighty pounds). But this does not indicate the final disposition of the grain in Astrakhan', nor does it mention the existence of state granaries.

Russian boats carrying produce and military supplies for the besieging forces. Replacement supplies were sent from Sviiazhsk; when those supplies were not sufficient, the tsar sent all the way back to Moscow for additional supplies.[77] It was not a common practice, but that may be because newly-created border garrisons performed this function in the south after 1556, and the distances covered in the west and north were so much shorter.

The time of year in which campaigns were waged, the terrain and the distance travelled had a significant impact on logistical requirements. Traditionally European and Ottoman armies during this period only campaigned from late spring to early autumn. Once snow arrived, both sides would retire to a winter garrison until the following spring.[78] This was not the case in Russia.[79] True, the late fifteenth-century army traditionally campaigned in the summer and early autumn. Before 1514 the Crimean Tatars were not a threat, for Mengli Girei was an ally of Moscow. Thus, during Ivan III's 'gathering of the lands', campaigns were usually conducted in the summer: Novgorod (September), Tver' (August), Viatka (August), etc.[80] After Russia's conquest of Smolensk (in 1514) and a shift of power in the region, the Crimean Tatars changed sides and constantly raided Muscovy, usually in the summer. Moscow's construction of an elaborate defence line of garrisons on her southern border and the deployment of field armies along the Oka reflected Moscow's evaluation of the Tatars as its greatest threat. The 1571 invasion during which the Crimean Tatars reached and burned Moscow drove this point home. Therefore the Muscovites waited until the annual Crimean threat had abated until they began their own

[77] *PSRL*, VIII, part 1, p. 205.

[78] As in Western Europe, the Ottomans did not campaign throughout the year because of the feudal nature of parts of the army, a political system that demanded that the sultan and standing forces periodically return to Istanbul, and the extremely poor road conditions during winter. Ottoman campaigns were conducted mainly between April and September. The army itself was demobilized during the winter. In October or November the orders were sent out to the spahis (cavalrymen who held estates in exchange for service) to begin collecting taxes and supplies and to be prepared for muster in April with appropriate arms, horses and retainers. In reality, it was difficult for the entire army to gather before July, so most campaigns belatedly took place in August or September. An Ottoman army had to move constantly to find enough forage for the great number of horses, draft animals and food herds. Once the army lived off the land in one place, it could not expect to return there that same growing season and find sustenance. Therefore, it was most difficult to carry on a sustained operation in any one region. Hungary, which was normally a 90–100 days march from Istanbul, represented the exhaustion point of Ottoman logistics support into sixteenth-century Europe (Paul Coles, *The Ottoman Impact on Europe*, New York, 1968, p. 103).

[79] Of sixty-one campaigns begun by Moscow (as opposed to those initiated by enemy invasion), twelve were begun in winter, fourteen in spring, twenty in summer, and fifteen in autumn. Thus, while half (thirty-four) were fought during the traditional campaign season, twenty-seven of sixty-one were fought 'off season'.

[80] Thirteen of thirty summer campaigns date before 1514. Six of the remaining seventeen were against Kazan'.

expeditions against either their traditional rivals, Poland–Lithuania, or their new Baltic rival, Sweden.

Campaigns in the Volga valley, however, occurred mostly between April and July.[81] Spring departures allowed sufficient time to travel down the Volga, lay siege, and return before autumn. The Volga River between Moscow and Kazan′ is frozen from 120 to 160 days a year. During this period forage would be available for cavalry detachments travelling overland. Two winter campaigns soon after Ivan IV was crowned tsar were disasters.[82] In December 1547 an army left Vladimir with artillery; transit was difficult down the icy waters, and supplies were lost. The ice melted early and the troops were unable to cross.[83] A second winter campaign, begun in December 1549, was equally unsuccessful. The army was buffeted by strong winds and rain; it was so damp that the artillery could not fire.[84] Russia was vulnerable because it had no immediate supply base close to Kazan′. This was rectified in 1551, when Ivan built a fortress at Sviiazhsk, which served as a forward supply depot and garrison. He switched to a spring campaign (April) in 1552 and was finally successful.[85]

The first campaign against Astrakhan′ began in April 1554, 'as soon as the ice melted'.[86] A force of 30,000 men departed by ship down the Volga under the command of Iurii Pronskii; a second force under Aleksandr Viazemskii departed from Viatka and travelled via the Viatka, Kama and Volga rivers.[87] An early departure was necessary because of the longer distance to Astrakhan′, which took nearly two months. The forces did not meet up at the stretch where the Don and the Dnieper rivers are closest until 29 June.[88] An additional constraint was the water level. According to Olearius, 'Ships or large boats that travel to Astrakhan on the Volga wait to start on their way [from Nizhnii Novgorod] until the river is rising or is at flood level, which occurs in May or June, when the rivers to the north swell and pour the abundant waters into the Volga. Then the boats may pass safely not only over the shallows but also over low-lying islands, which are then

[81] Six of eight invasions occurred in the summer (1487, 1506, 1524, 1530, 1545 and 1552). Of four post-conquest campaigns in reaction to internal events in Kazan′, i.e. uprisings against Muscovite allies or rebellions after 1552, three forced winter campaigns.

[82] If forces failed to supplement dwindling supplies, the results were disastrous for the army, regardless of the season. During the reign of Ivan III (1467), Prince I. V. Strigin Obolenskii failed to secure Kazan′ because the autumn was cold and rainy and food was so scarce that soldiers ate meat during the religious fasting period ('postnye dni') and their horses died of hunger (Solov′ev, Book 1, vol. 5, pp. 1412–14).

[83] *PSRL*, XIII, part 1, pp. 158–59; part 2, pp. 457–58.

[84] *PSRL*, XIII, part 2, pp. 460–61.

[85] *PSRL*, XIII, part 1, pp. 204–19.

[86] Solov′ev, vol. 6, part 3, p. 94.

[87] Korotkov, p. 39.

[88] Ibid.

under water.'[89] Learning from freed Russian captives that the main forces of the Nogai khan were deployed on small islands near Astrakhan', Pronskii split his force in two. He left his large ships behind, and sent one force on smaller, faster craft against Astrakhan'; the second force under Viazamskii targeted the *stan* of the Astrakhan' khan Iamgurchei and destroyed it, capturing his artillery as well. The second campaign against Astrakhan' in 1556 was precipitated by internal events; the predominantly infantry force (strel'tsy, Urban Cossacks and forces from Viatka) departed in March.

Campaigns into Livonia at the turn of the century (when the Crimean Tatars were allies) began in the summer, continuing into the autumn; for example, in 1501 a July offensive into Livonia expanded into an autumn offensive which reached as far as Dorpat (November). By the reign of Ivan IV most campaigns were conducted in the late autumn and winter after the end of the Tatar raiding season. The initial invasion in 1558 began in January, continuing throughout the summer. During the second phase of the Livonian War, when Poland–Lithuania, Sweden and Denmark intervened, winter campaigns were more common (November 1565, 1572–73, 1574–75), but there were exceptions. The siege of Reval by a Russian expeditionary force, began on 21 August 1570,[90] continued for thirty weeks (16 March 1571), until news of a Crimean Tatar invasion forced the tsar to pull forces out to deploy southward.

Muscovy fought two major wars with Lithuania at the turn of the century,[91] when the Crimean Tatars were allies and invaded Lithuania instead of Muscovy. Russian operations continued throughout the year, with only just over half occurring between May and September.[92] After 1514, offensive operations shifted to the winter: a 1515 raid on Roslavl' was conducted in January, and operations in 1534 commenced in October. During the second phase of the Livonian War the Russians attacked Ozerishche in November 1565. The final defensive phase against Stefan Bathory of Poland witnessed the lone summer offensive, against Vitebsk, in July 1580.

Muscovy invaded Sweden predominantly in autumn or winter.[93] Travel was easier in the winter when the marshy Karelian Peninsula

[89] Baron, p. 295.

[90] The 3,000-man force left Moscow on 25 July; it took nearly a month to reach the Baltic coast. V. B. Koroliuk, *Livonskaia voina*, Moscow, 1954, p. 73.

[91] The Russo–Lithuanian War of 1500–03 and the Russo–Lithuanian War of 1512–14.

[92] Operations during the 1500–03 war predominated during the summer, but during the 1512–14 war they occurred all the year round, to include attacks on Smolensk (November 1512–January 1513) and Kiev (December 1512).

[93] Of seven campaigns, one occurred in May, the others between September and December.

was frozen over, and there were numerous towns to provide foodstuffs. The harvest was gathered and the stored grain accessible.

All four Don River campaigns were in the spring or early summer as river craft set sail down the Don. This is due to the fact that the Don River is covered with ice for 80–120 days a year, and the Sea of Azov freezes in the winter as well.[94] Expeditions would delay until the river was navigable and personnel and horses did not risk instant death in icy waters. The journey from Moscow to Azov took nearly two months.

Strategic as well as climatic concerns dominated planning. For example, the Russian army invaded Livonia in January 1559; a Crimean Tatar invasion in support of its ally was always a consideration. Ivan signed a truce for the period March to November in Livonia. In this case, however, the Russians decided to carry the war to the Crimean Tatars instead of passively awaiting their attack. The goal of the 1559 campaign was destruction of the Crimean Tatar bases of operation at the mouth of the Dnieper and liberation of Russian captives. A joint expedition departed in February 1559; Prince Dmitrii Ivanovich Vishnevetskii sailed down the Don toward Azov and Kerch, while a second force under Daniil Fedorovich Adashev (with three cavalry regiments) travelled down the Dnieper.[95] Vishnevetskii sent back news of operations near Azov in April. Adashev reported ground and naval action near Ochakov in July.[96] A comparable amount of time was also required to return before the winter freeze, although the trip must have been much more difficult returning upstream.

Thus, we can see that after 1514 summer warfare was essentially defensive, directed against the Crimean Tatar threat. Garrison fortresses on the southern frontier held sufficient provisions for cavalry forces alerted to a Crimean Tatar approach. Autumn and winter operations were more prevalent in the Baltic area because the frozen marshlands were easier to cross during the cold season, both by troops and logistics trains. The Baltic was urbanized and provided ample supplies to be 'requisitioned' following the harvest. Also, as noted by Possevino, the Russians knew the technique of freezing rations and transporting them to an assembly area. Southern campaigns against Kazan′, Astrakhan′ and the Don and Dnieper river valleys began in late winter once the rivers were passable, because of the time it took forces to arrive in theatre, conduct summer operations and return.

The role of rivers in supporting Russian military operations cannot be over-emphasized. Rivers were not only a major means of transportation, they had served historically to unite the Russian state. The

[94] Harold Fullard, *Soviet Union in Maps*, Chicago, 1972, p. 4.
[95] *PSRL*, XIII, part 2, pp. 315–16.
[96] Ibid., p. 318.

very existence of the first Russian state (Kiev) was due in part to the trade route 'from the Varangians to the Greeks'. Rivers, connected with overland passages, formed traditional trade routes which were well-known to Russian merchants, who could provide key intelligence on food and water supplies, the local populace, topography, the distances between sites, etc. For example, one of the trade routes to the west went from Novgorod through Pskov, Ivangorod and Narva to Riga.[97] Southern trade routes left Moscow by either a water or land route to Kolomna and Riazan′; from there, three possible trade routes (Mikhailov, Riiazhsk, or Staraia Riazan′) continued to Voronezh and the Don River. The southern route from Moscow to Azov was approximately 2,230 kilometres and took fifty-five days. Another southern trade route, used also by Turkish and Crimean embassies, was an overland route through Belgorod, Putivl′, Novgorod Severskii, Briansk, Bryn′, and Kaluga. After the annexation of Kazan′ and Astrakhan′, the Volga River became a more important trade route, especially in connection with the Oka River (on which many key Muscovite military posts were located). The Volga route from Moscow to Astrakhan′ took one-and-a-half to two months.[98] Because these routes were also used by the military, a merchant infrastructure was in place to provide logistical support for forces while they were still within Muscovy's boundaries; this was very important, for the distance from the centre to the fringes of the state more often than not was the major part of the journey, especially in the south.

Muscovy had an extensive inventory of sea-going and riverine craft that was available for military use.[99] Traditionally Muscovy's naval ships were riverine craft used for expeditions down the Volga, Don and Dnieper, but there were efforts to create a 'blue water fleet'. Access to the Caspian Sea was cut off until Ivan IV's conquest of Astrakhan′ in 1554, but after its capture Russia immediately began development of a sea-going naval force; the British adventurer Anthony Jenkinson, who travelled to the Caspian Sea, spoke of sighting Russian armed brigantines there in 1561.[100] Moscow maintained a large boatbuilding works

[97] L. M. Marasinova, 'Torgovlia i sredstva peredvizheniia' (hereafter Marasinova), in A. V. Artsikhovskii, *Ocherki russkoi kul′tury XVI veka*, vol. 1, Moscow, 1976, p. 277. We have no inventory of how many ships were available to the state and what their load capacity was. However, a survey of the variety of sixteenth-century craft suggests that quite large loads could have been carried.

[98] Ibid., p. 278.

[99] The German oprichnik Heinrich von Staden claimed that the Russians 'have no ships and do not use the seas', but he served in Russia after the great campaigns to annex Kazan′ and Astrakhan′, and oprichnyi strel′tsy were not involved in any major river campaigns. Heinrich von Staden, *Land and Government of Muscovy*, Stanford, 1967, p. 81 (cited Baron, p. 103).

[100] Samuel Baron, 'Shipbuilding and Seafaring in Sixteenth Century Muscovy', *Essays in Honor of A. A. Zimin*, Columbus, Ohio, 1985, p. 125.

at Astrakhan' and twice yearly (spring and summer) sent armed vessels with strel'tsy to Karahanskii harbour on the eastern shore of the Caspian Sea to enable Russian merchants to trade with Khivan and Bukharan merchants.[101] After Ivan IV's conquest of Narva (1558), Russia made small efforts to establish a Russian fleet with English assistance, but they came to naught with Narva's reconquest in 1581. Russian fishermen regularly sailed the White Sea. In the late fifteenth century Russian ships even rounded the Scandinavian cape of Norway. Russia sailed this route only occasionally, but Samuel Baron feels it spoke for the existence of vessels of some seaworthiness, skilled pilots, and sufficient geographical knowledge to carry out such a journey. More common were fishing fleets sailing at least 750 miles east of the White Sea, penetrating the basins of the Iana, Indigivka, Alazeia and Kolyma rivers.[102]

The bulk of Russian vessels, however, were river craft, a wide variety of which existed in the sixteenth century, capable of supporting long-distance logistics tasks. The *nasada* was a long, wide, flat-bottomed wooden boat which sat in the water no more than four feet and carried two hundred tons. Although it used sails, it could also be pulled by men on shore. The nasada was found on the Dvina and, more commonly, the Volga rivers. Predominantly a river craft, it could also be used on lakes or seas. Nasadas ten *sazhens*[103] (or seventy feet) long are mentioned in a note sent to boyar Dmitrii Godunov in 1592.[104] The boat often associated with the nasada was the flat-bottomed *doshchanik*, which could carry a load anywhere between thirty-five and 150 metric tons, although bigger loads were rare. It could be carried by the river current, be towed from shore, use oars, or mount a sail for down-wind travel. Russian craftsmen constructed doshchaniks completely without metal. One lone shipyard, Verkhotur'e, the major yard for Siberian traffic, turned out up to a hundred doshchaniks a year in the early seventeenth century.[105] Chronicles usually used the term *strug* to refer generically to any 'ship', but properly speaking the strug was the principal ship for the transport of cargo; six to seventeen metres in length, it was also capable of sea travel. A strug approximately fifteen metres long could carry 600 metric tons. Olearius described a flat-bottomed Volga craft with sails resembling a strug which carried 200 persons and could carry up to 400 to 500 *lasts* of freight.[106] A new ship

[101] Ibid., pp. 104–05.
[102] Ibid., p. 115.
[103] A *sazhen* equalled 2.134 metres or 7 feet.
[104] Marasinova, pp. 283–84.
[105] Terence Armstrong (ed.), *Yermak's Campaign in Siberia*, London, 1975, p. 19.
[106] Baron, p. 297. One *last* equalled 4,320 pounds.

which appeared in the sixteenth century was the *kolomenka*, a long and very narrow boat used for transport of heavy goods.[107]

Aside from these large ships, many medium-sized boats transported men and cargo: the *pauzka*, *botnik*, *kosnaia lodka*, *plavnaia lodka*, *stuzhka* and *nevodnik* among others. The pauzka travelled with larger ships, but was used for ferrying provisions where larger ships could not go, such as carrying passengers to a shallow shore.[108]

Smaller ships were not useful for military transport, but there is evidence that they were used by military couriers. Kurbskii mentions that when the Kazan′ campaign became bogged down, the tsar dispatched an embassy to Moscow to retrieve a religious relic. 'Swift, small vyatka sailing boats' completed the segment to Nizhnii Novgorod in only three to four days; from there the journey was completed in fast-moving carriages.[109]

Ships were built throughout Russia. Vologda was the largest shipyard, specializing in rivercraft and launches. Sir Jerome Horsey witnessed the 'great vessels and barks' built and prepared at Vologda, whose fame was such, he told Ivan IV, that along with people flocking to see them upon a festival day, 'I ventured with thousands more to behold the curious beauty, largeness, and strange fashion of them.'[110] The industrial town of Ustiuzhna Zheleznopol′skaia specialized in the larger river cargo craft; craftsmen there produced the ships' metal parts such as iron shackles. The large shipbuilding centres of Kazan′, Nizhnii Novgorod, Astrakhan′ and Kaluga were all located on the Volga and its tributaries.[111]

The size of the Russian river forces is suggested in an incident during the 1524 campaign against Kazan′. Herberstein related that in the early morning, before dawn, while the entire bank of the river was covered with a thick fog, the Cheremissy made a sudden attack upon the ships, and threw such terror among the Russians, that Palitszki (Paletskii?), the commander of the fleet, left ninety of his largest vessels, each containing thirty men, in the hands of the enemy. He cast off his own boat from the shore and sought safety in the middle of the Volga, where he escaped under cover of the mist and reached the army (almost in a state of nudity). Herberstein claimed that a similar fate befell Palitzki when he returned with several vessels. He again fell into the snare of the Cheremissy, and not only lost his vessels, but escaped only

[107] Marasinova, p. 284.
[108] Ibid., p. 286.
[109] Kurbskii, p. 53.
[110] Horsey, pp. 290–91.
[111] Ibid., p. 288.

with great difficulty with a very few of his men.[112] Aside from Paletskii's tale of woe, Herberstein's story reveals the large size of Russian fleets early in the sixteenth century. It is not possible to verify the number or clarify what ships were described, but if we assume the nasada (the most common river cargo craft, capable of carrying 200 tons) was used, the cargo fleet potentially carried, as a minimum, 18,000 tons of supplies and nearly 300 crewmen, for not all the ships were originally lost. Such fleets would be even greater after the conquest of the Volga valley in the 1550s with new shipbuilding facilities and the demand for large cargo ships capable of sailing into the Caspian Sea. According to Solov'ev, the Russian fleet that conquered Astrakhan' carried 30,000 tons; the exact type and number of ships is unknown.[113]

We have not yet addressed the question of who directed these logistical operations. The administrative infrastructure developed to co-ordinate production, distribution and transport of military supplies was the chancellery system, which supported the Muscovite army with a mixture of functional and geographical episodes. The Bronnyi (Weapons Production) Prikaz oversaw manufacture of armour, firearms and hand weapons.[114] The Oruzheinaia Palata (Armoury) oversaw production of firearms and hand weapons in the Kremlin Armoury.[115] The Pushechnyi (Artillery) Prikaz[116] was responsible for the maintenance of artillerymen in field armies and garrisons during war and peace. The Artillery Prikaz also oversaw the production of artillery, powder and shells in munitions factories.[117] The Streletskii (Musketeer) Prikaz was responsible for maintaining the musketeer battalions, and overseeing the appointment of strel'tsy commanders, their land grants, and court cases.[118] The Prikaz Kazanskogo Dvortsa (Kazan' Chancellery) administered the conquered territories of Kazan' and Astrakhan', but it was also responsible for raising troops from among the Tatars, Cossacks and native tribes within its jurisdiction.[119]

[112] Herberstein, II, 70. It is difficult to use isolated incidents such as Herberstein's anecdote to trace the development of logistics. We have no evidence to verify the incident itself much less the size of the river force. The Razriadnaia Kniga for 1524 does not mention any prince (much less Paletskii) in charge of transport (*oboz*). He was not the commander of water forces, nor was he mentioned as a voevoda within any regiment for artillery (whose guns would pose a major logistics challenge). Herberstein was not above reporting outright gossip or plagiarizing from other sources. If the story is true, he would have heard it second-hand. Since the focus of the anecdote is on the conduct of the commander and not the river force, an acceptable figure for the number of boats to give the story credence is arguable.

[113] Solov'ev, Vol. 6, Part 3, 94.

[114] Peter Brown, 'Muscovite Government Bureaus' (hereafter Brown), *Russian History*, 10, part 3, 1983, p. 294.

[115] Ibid., p. 303.

[116] Later Pushkarskii Prikaz.

[117] A. Lebedianskaia, 'Arkhiv Pushkarskogo Prikaza', *Voprosy Istorii*, 1, 1946, pp. 122–23.

[118] Brown, pp. 325–26.

[119] Ibid., p. 310.

The premier chancellery for military affairs, however, was the Razriadnyi (Military) Prikaz; although references to military clerks and record-keeping date from the late fifteenth century, it probably became a formal prikaz in the 1550s during Ivan IV's military reforms. It was in charge of all military appointments and administered a number of cities in the south. It maintained the military service rosters and oversaw the mustering of troops activated for offensive and defensive campaigns. In wartime it laid out for the commander-in-chief the identity of the enemy, which cities and provinces were to provide service personnel, when and where the individual regiments would meet, what the complete make-up of the army would be, who would command specific regiments, who would be in charge of wages and supplies, the route of march of the separate regiments and the operational war plan.[120] Clerks from the Razriadnyi Prikaz co-ordinated the procurement of military supplies, their transport and distribution. They travelled with the army on campaign and provided centralized guidance over all logistical matters.

Within the field armies themselves, however, we know that specialized military positions developed which eventually gained *voevoda* status as commanders of a separate transportation regiment. These transport officers worked under the general supervision of the razriad clerks to control actual operations on the ground. Their growing importance is shown by the service lists for 1575–76 (7084) for a summer campaign against the Crimean Tatars (accompanied by the tsar himself) in which the Main Regiment, Advanced Regiment, Right Wing and Transport Regiment were all commanded by boyars.[121] Transport *voevody* even began to initiate *mestnichestvo* disputes with other *voevody*! Who, then, were these transportation specialists and what do we know about their careers?

Specialization probably occurred first within the Military Chancellery (Razriadnyi Prikaz) as it selected individual clerks to supervise the riverine craft and supply trains. These men sometimes developed into logistics specialists. That specialization expanded as military servitors were allotted subordinate transport duties. The Razriadnye Knigi (service lists) for 1475 to 1598 list thirty-three men serving with 'oboz', seven of whom were princes. The advent of personnel mentioned specifically with transport forces occurred relatively late in the sixteenth century,[122] although no doubt someone (an officer or razriad

[120] A. A. Chernov, *Vooruzhennye sily russkogo gosudarstva v XV–XVII vv*, Moscow, 1954, p. 98. There was no separate naval chancellery. The procurement of craft for military operations was probably overseen by the clerks of the Razriadnyi Prikaz, while transport officers were in charge during the actual campaign, as part of *oboz*.

[121] *Razriadnaia kniga 1475–1598*, ed. V. I. Buganov, Moscow, 1965 (hereafter *RK 1475–1598*), pp. 361–62.

[122] The first mention of such a transport specialist was in 1574.

clerk) was always appointed to handle transportation on an *ad hoc* basis.[123]

Evidence regarding logisticians' careers is sketchy at best. About half of the transportation officers (sixteen) had no prior service listed in the Razriadnye Knigi before their appointment to a transport position.[124] Few had much of a logistics career after their appointment; twenty-six of the thirty-three are listed as logisticians only once, four served twice, and only three served three separate transport assignments.[125] However, lack of a mention in the service records would not preclude a servitor from having worked at a variety of more menial assignments within the transport system prior to his listing, or further service afterwards under more senior servitors. Some of the transport officers may have performed exactly the same assignment prior to 1574 when such service was not annotated.

The development of Muscovite state institutions for transport is revealed in the type of assignments the thirty-three men held.[126] The career pattern for transport officers mirrored that of artillery officers. Initially they were listed simply as 'concerning transportation', then linked with artillery ('artillery/transport'). Next, references to *voevody* and *golovy* in charge of artillery/*oboz* (without regimental status) began to appear. Regimental service lists then mentioned *voevody* attached to

[123]

1574	2 (of 33)	1588	4
1575	2	1591	10
1576	8	1593	1
1578	1	1598	5

[124]

0 years	16 (of 33)	11–15 years	3
1–5 years	6	16–20 years	3
6–10 years	2	21 + years	3

[125] Ivan Munzorin first appeared in the lists in July 1591 as a *golova* in the Transport Regiment during the Crimean Tatar invasion of Moscow. Two years later he reappeared as a transport *golova*. In April and May 1598 he is mentioned as *golova* of transportation within the Sovereign's Regiment against the Crimean Tatars (*RK 1475–1598*, pp. 443, 475, 524, 531). Osip Timofeevich Pleshcheev is first mentioned in January 1590 as a scout for the Sovereign's Regiment, then the following month was a *voevoda* in the Guard Regiment at Rakovor. He served as a *voevoda* in the Transport Regiment in July 1591 during the Crimean Tatar invasion. After two more assignments as troop *voevoda*, he returned as *voevoda* for transport in 1593. Following service as garrison *voevoda* at Surgut (1596–97), he served as *voevoda* for transport in the Sovereign's Regiment (April and May 1598). (*RK 1475–1598*, pp. 416, 423, 443, 466, 475, 505, 514, 524, 531.) Petr Stromilov (Stremilov) was first mentioned in July 1591 as transport *golova* during the defence of Moscow. He served again as a transport *golova* in 1593 and within the Sovereign's Regiment as transport *golova* during the 1598 Crimean Tatar invasion (*RK 1475–1598*, pp. 443, 475, 524, 531).

[126]

'concerning transportation'	3
artillery/transport	3
clerk	1
voevoda, artillery/transport	3
golova, artillery/transport	6
voevoda, transport, Sovereign's Regiment	2
golova, transport, Sovereign's Regiment	1
voevoda, Transport Regiment	7
golova, Transport Regiment	7

the Main Regiment (or Sovereign's Regiment if the tsar commanded) in charge of 'oboz'.[127] Such a *voevoda* might have subordinate *golovy*. One clerk was also named, but because there was never a specialized transport chancellery, he was probably dispatched from the central Razriadnyi Prikaz. By the last quarter of the century, at the tail end of the regimental appointments list[128] references to formal transport regiments appeared, including assignments for *oboz voevody* and *golovy*.

Although the notations for the Transport Regiment are in the same bureaucratic format as for combat regiments, development of a comparable chain of command (subdivided into hundreds, fifties and tens) is doubtful. Muscovite transport personnel were levies of peasants (*pososhnye liudi*) raised for each campaign. These men also transported artillery pieces and served as engineers, building roads and bridges. What percentage were used for logistics is not known; nor do we know if specialization occurred, whereby some consistently worked in construction, while others drove baggage trains, or if a general pool of labour switched jobs at will. The *oboz voevody* and their subordinates must have served as supervisors of a work-force continually in flux.

Transportation officers were often linked with artillery, perhaps because the problems of transporting supplies and artillery pieces were so similar. Indeed, as noted, at first the positions were linked on the service lists as 'artillery/transport' officer. Identified transport officers did serve on other campaigns as artillery officers. Three of the thirty-three transport officers served 'with artillery forces'; three served as *golovy* in the Artillery Regiment; and three served as *voevody* of the Artillery Regiment.

Both artillery and transport provided lesser gentry entry into the service lists. The few scattered distinguished servitors (e.g. Prince I. M. Viazemskii who served as *voevoda* for transport in the Sovereign's Regiment in 1598) were far outnumbered by the nonentities (such as Leontii Vakhrameev, Rozhil'dei Liubucheninov or Gavrila Vikent'ev) making their first razriad appearance in the transport listings. Ten of the thirty-three officers were never mentioned again other than in their single transportation assignment. However, the other twenty-three appear in a variety of prestigious assignments (meriting inclusion in the service lists), which suggests that although transport assignments were not a 'plum', they were a stepping stone. Subsequent assignments included *voevoda* (garrison and regimental); *golova* (regimental, garrison, artillery and transport); regimental

[127] At the end of the regimental list, often under the third voevoda.
[128] Therefore junior in precedence to the other regiments, but theoretically eligible to petition.

commander, and clerk.[129] Three men later served as *namestniki*.[130] Prince V. A. Sitskii was selected as an *oprichnyi* boyar by 1568.

The rise of transport officers is also seen by the initiation of a *mestnichestvo* dispute between an artillery officer and a transport *voevoda* in 1587–88 (7096). Prince V. I. Rostovskii was first *voevoda* of the Transport Regiment; *okol'nichii* I. I. Saburov was first *voevoda* of the Artillery Regiment. Prince Rostovskii claimed that service in the Transport Regiment meant that he was junior to Saburov, and he protested at the listing. His petition was refused without explanation, so we do not know whether he *was* considered junior or if there was no such relative ranking between the two new regiments.[131] However, it must be noted that a dispute between a prince and an *okol'nichii* does not reflect the relative standing of the rank and file of both services.

It is difficult to establish a concrete, accurate assessment of Muscovite logistics. The sources are usually fragmentary and inadequate; we are forced to refer to travellers' accounts, which themselves are often based on hearsay and gossip. Nevertheless, the image which emerges by the end of the sixteenth century is that of a logistics system constantly evolving to meet increasingly sophisticated requirements. Cavalry troops developed a series of field rations they could prepare and bring along (or send ahead), supplemented by a wide variety of native foodstuffs foraged, purchased or requisitioned (a polite word for outright seizure). State agencies oversaw the production, distribution and resupply of non-gentry forces such as strel'tsy and artillery. A complex system of overland and river resupply existed. Extensive use of riverways and the development of a large river-going cargo fleet made possible the transit and resupply of Muscovite field armies. Although no specific bureaucratic chancellery developed to administer logistics other than the Razriadnyi Prikaz, there developed within the regimental system duty positions for logistics specialists and experienced men to fill them.

Muscovy developed its own amalgamation of private and state supply. Muscovy was faced with conducting operations over distances matched only by its Ottoman neighbours. The range of climatic

[129]

Garrison voevoda	8
Garrison golova	3
Regimental voevoda	3
Regimental golova	4
Regimental commander	1
Artillery golova	1
Transport golova	2
Clerk	1

[130] Prince I. S. Korkodinov, Novgorod Severskii, 1574–76; Prince I. S. Lobanov-Rostovskii, Tula, 1578; and S. F. Saburov, Belyi, 1584–85.

[131] *RK 1475–1598*, pp. 394–96; *Sinbirskii sbornik*, ed. by D. A. Valuev, Moscow, 1844, pp. 99–100.

settings from the frozen north, across barren steppes and sparsely populated border areas, to the subtropics of the Black Sea coast, was unique. Muscovy essentially possessed two separate armies: one predominantly cavalry with infantry and artillery support to fight the Tatars in the south, and a second force predominantly infantry and artillery with cavalry support to fight in the west and north. The logistical challenge was unprecedented in Renaissance Europe. The extent of expansion from the 'gathering of the lands' to the conquest of the Volga valley and the Baltic Sea coast, bears witness to the success of Muscovy in meeting that challenge. Military failure at the end of the Livonian War was not due to the collapse of Muscovite logistics. The Muscovite logistics system from 1462 to 1598 got field armies where they wanted them to be and kept them fed and armed — and that is what logistics is all about.